



## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

OGILVY RENAULT LLP / S.E.N.C.R.L.,  
S.R.L.  
Suite 1600  
1981 McGill College Avenue  
Montréal, Québec H3A 2Y3  
Canada

Date of mailing (day/month/year) 15 August 2005 (15.08.2005)	<b>IMPORTANT NOTIFICATION</b>
Applicant's or agent's file reference 14836-10PCT	
International application No. PCT/CA2004/000397	International filing date (day/month/year) 19 March 2004 (19.03.2004)

## 1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address OGILVY RENAULT Suite 1600 1981 McGill College Avenue Montréal, Québec H3A 2Y3 Canada	State of Nationality	State of Residence
	Telephone No. 514-845-7126	
	Facsimile No. 514-288-8389	
	Teleprinter No.	

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address OGILVY RENAULT LLP / S.E.N.C.R.L., S.R.L. Suite 1600 1981 McGill College Avenue Montréal, Québec H3A 2Y3 Canada	State of Nationality	State of Residence
	Telephone No. 514-845-7126	
	Facsimile No. 514-288-8389	
	Teleprinter No.	

## 3. Further observations, if necessary:

## 4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned  
☐ the International Searching Authority ☒ the elected Offices concerned  
☐ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 338.89.95	Authorized officer Diana NISSEN (Fax 338 8270) Telephone No. (41-22) 338 8054
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# PATENT COOPERATION TREATY

PCT/CA2004/00039

From the INTERNATIONAL BUREAU

To:

OGILVY RENAULT  
Suite 1600  
1981 McGill College Avenue  
Montréal, Québec H3A 2Y3  
CANADA

SECOND AND SUPPLEMENTARY NOTICE  
INFORMING THE APPLICANT OF THE  
COMMUNICATION OF THE INTERNATIONAL  
APPLICATION (TO DESIGNATED OFFICES  
WHICH APPLY THE 30 MONTH TIME  
LIMIT UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

Date of mailing (day/month/year)  
21 July 2005 (21.07.2005)

Applicant's or agent's file reference  
14836-10PCT

## IMPORTANT NOTICE

International application No.  
PCT/CA2004/000397

International filing date (day/month/year)  
19 March 2004 (19.03.2004)

Priority date (day/month/year)  
20 March 2003 (20.03.2003)

Applicant

MICROBRIDGE TECHNOLOGIES INC. et al

1. **ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), **does not apply**, please see Form PCT/IB/308(First Notice) issued previously.

2. Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:  
11 November 2004 (11.11.2004)

AU, AZ, BY, CN, CO, DZ, EP, HU, KG, KP, KR, MD, MK, MZ, NA, RU, SY, TM, US

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

3. The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, **does apply**, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1:

AE, AG, AL, AM, AP, AT, BA, BB, BG, BR, BW, BZ, CA, CR, CU, CZ, DE, DK, DM, EA, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, ID, IL, IN, IS, JP, KE, KZ, LC, LK, LR, LS, LT, LV, MA, MG, MN, MW, MX, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, SC, SD, SG, SK, SL, TJ, TN, TR, TT, UA, UZ, VC, VN, YU, ZA, ZW

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

### 4. TIME LIMITS for entry into the national phase

For the designated or elected Office(s) listed above, the applicable time limit for entering the national phase will, **subject to what is said in the following paragraph**, be **30 MONTHS** from the priority date.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain of the designated or elected Office(s) listed above. For regular updates on the applicable time limits (30 or 31 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's sole responsibility to monitor all these time limits.

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

Athina Nickitas-Etienne

# PATENT COOPERATION TREATY

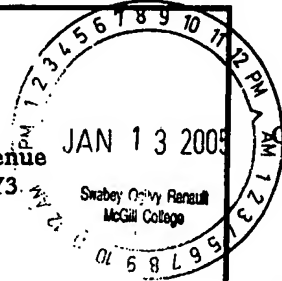
From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

# PCT

To:

OGILVY RENAULT  
Suite 1600  
1981 McGill College Avenue  
Montréal, Québec H3A 2Y3  
CANADA

Registered Mail



## NOTIFICATION OF RECEIPT OF DEMAND BY COMPETENT INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

(PCT Rules 59.3(e) and 61.1(b), first sentence  
and Administrative Instructions, Section 601(a))

Date of mailing  
(day/month/year) : 04-01-2005

Applicant's or agent's file reference

14836-10PCT AD

### IMPORTANT NOTIFICATION

International application No.

PCT/CA2004/000397

International filing date (day/month/year)

19/03/2004

Priority date (day/month/year)

20/03/2003

Applicant

MICROBRIDGE TECHNOLOGIES INC. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority considers the following date as the date of receipt of the demand for international preliminary examination of the international application:

23/12/2004

2. This date of receipt is:

- ☒ the actual date of receipt of the demand by this Authority (Rule 61.1(b)).  
☐ the actual date of receipt of the demand on behalf of this Authority (Rule 59.3(e)).  
☐ the date on which this Authority has, in response to the invitation to correct defects in the demand (Form PCT/IPEA/404), received the required corrections.

3. ☒ **ATTENTION:** That date of receipt is after the expiration of 19 months from the priority date. Consequently, in respect of some Offices, the demand does not have the effect of postponing the entry into the national phase until 30 months from the priority date (or later in some Offices) (Article 39(1)) and the acts for entry into the national phase must therefore be performed within 20 months from the priority date (or later in some Offices). However, in respect of some other Offices, the time limit of 30 months (or later) may nevertheless apply. See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

- ☐ (If applicable) This notification confirms the information given by telephone, facsimile transmission or in person on:

4. Only where paragraph 3 applies, a copy of this notification has been sent to the International Bureau.

Name and mailing address of the IPEA/



European Patent Office  
D-80298 Munich  
Tel. (+49-89) 2399-0, Tx: 523656 epmu d  
Fax: (+49-89) 2399-4444

Authorized officer

SCHNEIDER N M



STREET COPY RENAULT  
RECEIVED  
FEB 22 2005  
PCT

PATENT COOPERATION TREATY

PCT/CA2004/00039

From the INTERNATIONAL BUREAU

To:

OGILVY RENAULT  
Suite 1600  
1981 McGill College Avenue  
Montréal, Québec H3A 2Y3  
CANADA

INFORMATION CONCERNING ELECTED  
OFFICES NOTIFIED OF THEIR ELECTION

(PCT Article 31(7) and Rule 61.3)

Date of mailing (day/month/year) 17 February 2005 (17.02.2005)		IMPORTANT INFORMATION	
Applicant's or agent's file reference 14836-10PCT			
International application No. PCT/CA2004/000397	International filing date (day/month/year) 19 March 2004 (19.03.2004)	Priority date (day/month/year) 20 March 2003 (20.03.2003)	
Applicant MICROBRIDGE TECHNOLOGIES INC. et al			

- The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:  
**EP:** AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR  
**National:** BG, CA, CN, CZ, DE, JP, KP, KR, MN, NO, PL, RO, RU, SK, US
- The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:  
**AP:** BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW  
**EA:** AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
**OA:** BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG  
**National:** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BR, BW, BY, BZ, CH, CO, CR, CU, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MW, MX, MZ, NA, NI, NZ, OM, PG, PH, PT, SC, SD, SE, SG, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW
- Since the election(s) was (were) made after the expiration of 19 months from the priority date, the applicant is reminded that he must, subject to the following paragraph, enter the national phase within 20 months from the priority date (or later in some Offices) before some of the designated Offices in respect of which Article 22(1), as modified with effect of 1 April 2002, does not apply, by paying the national fee(s) and furnishing, if prescribed, a translation of the international application.

However, in respect of most other designated Offices, the time limit of 30 months (or later) may nevertheless apply. See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters, the *PCT Newsletter* and the WIPO Internet site, updated regularly.

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Authorized officer

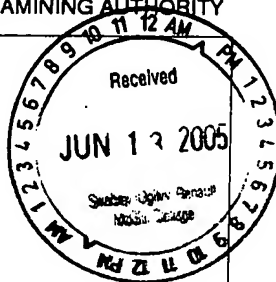
Athina Nickitas-Etienne

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: **AD**

OGILVY RENAULT  
Suite 1600  
1981 McGill College Avenue  
Montréal, Québec H3A 2Y3  
CANADA



## PCT

### NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing  
(day/month/year)

06.06.2005

Applicant's or agent's file reference  
14836-10PCT

#### IMPORTANT NOTIFICATION

International application No.  
PCT/CA2004/000397

International filing date (day/month/year)  
19.03.2004

Priority date (day/month/year)  
20.03.2003

Applicant  
MICROBRIDGE TECHNOLOGIES INC. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the International  
preliminary examining authority:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized Officer

Pinna, A

Tel. +49 89 2399-7955





# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 14836-10PCT		<b>FOR FURTHER ACTION</b>		See Form PCT/PEA416
International application No. PCT/CA2004/000397		International filing date (day/month/year) 19.03.2004		Priority date (day/month/year) 20.03.2003
International Patent Classification (IPC) or national classification and IPC H01C17/26				
Applicant MICROBRIDGE TECHNOLOGIES INC. et al.				
<p>1. This report is the International preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 9 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 13 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 23.12.2004		Date of completion of this report 06.06.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Plützer, S Telephone No. +49 89 2399-5873 		

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/CA2004/000397

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-33 as originally filed

**Claims, Numbers**

1-82 filed with telefax on 30.03.2005

**Drawings, Sheets**

1/18-18/18 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing *(specify):*
  - ☐ any table(s) related to sequence listing *(specify):*
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing *(specify):*
  - ☐ any table(s) related to sequence listing *(specify):*

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/CA2004/000397

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**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

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1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:
- ☐ the entire international application,
  - ☒ claims Nos. 17-49,64-82  
because:
    - ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):
    - ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 17-49,64-82 are so unclear that no meaningful opinion could be formed (*specify*):  
**see separate sheet**
    - ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
    - ☐ no international search report has been established for the said claims Nos.
    - ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
      - the written form ☐ has not been furnished
      - ☐ does not comply with the standard
      - the computer readable form ☐ has not been furnished
      - ☐ does not comply with the standard
    - ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.
  - ☐ See separate sheet for further details



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/CA2004/000397

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-16,50-63
	No: Claims	
Inventive step (IS)	Yes: Claims	1-16,50-63
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-82
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. Claims 17 - 49 and 64 - 82 are not clear and, hence, do not comply with the requirements set forth in Article 6 PCT.
  - 1.1. Claim 17 attempts to define the subject-matter in terms of the result to be achieved ("... specifying physical parameters for said component **to obtain** said trimmable range for said resistance and said trimmable range for said temperature coefficient ..."), which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.
  - 1.2. The term "decision-making-module" in claim 33 is unclear, since it leaves the reader in doubt, **which** decisions are made and **how** the decisions are made, in order to achieve the object of the invention.
  - 1.3. Also Claim 64 attempts to define the subject-matter in terms of the result to be achieved ("... is set ..."), which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

It should be noted, that the features of claim 65 are not suitable to clarify claim 64. Claim 65 attempts to define a product (the circuit) by its manufacturing process. However, in the present case it is not possible to distinguish a circuit with a resistor known from document *D1*, having a particular resistance value and a particular TCR value, from a circuit with a resistor, whose TCR is adjusted to this particular resistance value and to this particular TCR value in accordance with the method of any one of claims 1 - 32.

- 1.4. Claims 18 - 32, 34 - 49 and 65 - 82 are also unclear, because they are referred back to unclear claims 17, 33 and 64, respectively.
2. In view of the foregoing, it is impossible to give a reasoned statement under Rule 66.2(a)(ii) with regard to novelty and inventive step for claims 17 - 49 and 64 - 82.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. Reference is made to the following document:

*D1*: BABCOCK J A ET AL: "Polysilicon resistor trimming for packaged integrated circuits" ELECTRON DEVICES MEETING, 1993. TECHNICAL DIGEST., INTERNATIONAL WASHINGTON, DC, USA 5-8 DEC. 1993, NEW YORK, NY, USA, IEEE, 5 December 1993 (1993-12-05), pages 247-250, XP010118446 ISBN: 0-7803-1450-6

2.1. The document *D1* is regarded as being the closest prior art to the subject-matter of claim 1 and shows (the references in parentheses applying to this document):

A method for adjusting the resistance, *R*, of a thermally mutable resistor material (figure 5) and a method for adjusting the temperature coefficient of change of the resistance, TCR, of said resistor (figure 3). This method comprises as a matter of course the trivial steps of

- selecting a target resistance value (or a TCR value)
- trimming the resistance value (or the TCR value) until it is substantially equal to the target resistance value (or the target TCR value, respectively)

2.2. The subject-matter of claim 1 differs from this known method in that

the resistance value **and** the TCR value are trimmed **independently** to their target values by

- trimming the resistance value until it is substantially equal to the target resistance value
- trimming the TCR value until it is substantially equal to the target TCR value, while maintaining the resistance value substantially equal to the target resistance value

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

**PCT/CA2004/000397**

by cycling the resistance away from and back to the target resistance value, thereby using a R-TCR-hysteresis characteristics of the thermally mutable resistor material.

2.3. The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

2.4. The problem to be solved by the present invention may be regarded as

providing a method for trimming the resistance value **and** the TCR value of a thermally mutable resistor material **independently**.

2.5. The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The documents cited in the International Search Report do not suggest, that the resistance value and the TCR value of a thermally mutable resistor material can be trimmed independently by the proposed method, because these documents do not teach a R-TCR-hysteresis characteristics of the thermally mutable resistor material.

2.6. Claims 2 - 16 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

3. For the same reasons as given in paragraph 2. above, the subject-matter of claim 50 and claims 51 - 63, dependent on claim 50, is new and involves an inventive step.

**Re Item VII**

**Certain defects in the International application**

1. Independent claims 1, 17, 33, 50 and 64 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(I))

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/CA2004/000397

PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

2. The features of all claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

**Re Item VIII**

**Certain observations on the international application**

1. The application does not meet the requirements of Article 6 PCT, because claims 1 - 8 are not clear.
  - 2.1. Throughout the whole description there are no other electrical components mentioned than resistors. Hence, the term "electrical components" as used in independent claims 1, 17, 33, 50 and 64 renders the scope of these claims broader than justified by the description. Therefore, said claims are not supported by the description as required by Article 6 PCT.
  - 2.2. For the discussion under item V the term "electrical components" is interpreted as "resistors".
- 3.1. The term "micro-platform" as used in claims 6, 8, 11, 24, 26, 29, 37, 38, 39, 45, 60, 62, 78, 79 and 81 is unclear, since it is not well-defined and, hence, open to arbitrary interpretation. In particular, it leaves the reader in doubt as to the size and the structure of the "micro-platform".
- 3.2. For the discussion under item V the term "micro-platform" is interpreted as a "platform suspended over a depression", as shown in figures 9 and 10.

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

PCT/CA2004/000397

4. Also claims 2 - 16, 18 - 32, 34 - 49, 51 - 63 and 65 - 82 are unclear, since they are referred back to unclear claims.

\* \* \*

**WHAT IS CLAIMED IS:**

1. A method for adjusting resistance of an electrical component made of a thermally mutable material and temperature coefficient of change of said resistance, said thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, the method comprising:

selecting a target resistance value;

selecting a target temperature coefficient independent from said target resistance value and within a range of temperature coefficient values available for said target resistance value;

trimming said resistance value until said resistance value is substantially equal to said target resistance value; and

trimming said temperature coefficient until said temperature coefficient is substantially equal to said target temperature coefficient, while maintaining said resistance value substantially equal to said target resistance value by cycling said resistance value away from and back towards a starting point, thereby using said hysteresis characteristic of said thermally mutable material.

2. A method as claimed in claim 1, wherein said trimming said resistance comprises applying a heating cycle, and said heating cycle comprises a sequence of heat pulses to trim said resistance value in a first direction and a sequence of heat pulses to trim said resistance value in an opposite direction.

3. A method as claimed in any one of claims 1 and 2, wherein said trimming said temperature coefficient comprises selecting parameters of said heating cycle to determine a direction of trimming and an amount of trimming of said temperature coefficient.

4. A method as claimed in claim 3, wherein said selecting parameters comprises selecting a first heat pulse of said sequence of heat pulses of said heating cycle to be of a given amplitude to determine a change in said temperature coefficient.

5. A method as claimed in any one of claims 3 to 4, wherein said electrical component is a resistor.

6. A method as claimed in any one of claims 3 to 5, wherein said electrical component is on a thermally isolated micro-platform on a substrate.

7. A method as claimed in claim 6, wherein a resistive heating element is provided for generating said sequence of heat pulses.

8. A method as claimed in claim 7, wherein said heating element is on said thermally isolated micro-platform.

9. A method as claimed in claim 4, wherein said trimming said temperature coefficient comprises driving said temperature coefficient down by using a first pulse above a temperature coefficient reversal threshold, and driving said temperature coefficient up using pulses below said threshold.

10. A method as claimed in any one of claims 2 to 9, wherein said trimming said temperature coefficient comprises applying a plurality of heating cycles.

11. A method as claimed in any one of claims 9 to 10, wherein said electrical component is on a thermally isolated micro-platform.

12. A method as claimed in any one of claims 1 to 11, wherein said resistance and said temperature coefficient can be measured at room temperature before applying a succeeding heat pulse.

13. A method as claimed in claim 12, wherein said temperature coefficient is measured during a cooling of said component with respect to an arbitrary scale, and said target temperature coefficient is substantially zero.



14. A method as claimed in claim 12, wherein said target temperature coefficient corresponds to a non-zero relative temperature coefficient.

15. A method as claimed in claim 4, wherein said trimming said resistance comprises providing at least one pulse just above a trimming temperature threshold to precision-trim said resistance while obtaining a negligible change in said temperature coefficient.

16. A method as claimed in any one of claims 1 to 15, wherein said component is part of a bridge circuit and said trimming said resistance creates a balanced state of said bridge circuit.

17. A method for providing a circuit, the method comprising:

designing said circuit including at least one thermally-mutable component having a target resistance value and a target temperature coefficient of resistance value independent from said target resistance value, the thermally-mutable component being made of a material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance;

identifying a nominal resistance value having a trimmable range for said resistance including said target resistance value and a trimmable range for said temperature coefficient of resistance including said target temperature coefficient of resistance;

specifying physical parameters for said component to obtain said trimmable range for said resistance and said trimmable range for said temperature coefficient; and

manufacturing said circuit on a substrate wherein said component has said nominal resistance value.

18. A method as claimed in claim 17, further comprising:

trimming said nominal resistance value to be substantially equal to said target resistance value; and

trimming said temperature coefficient of resistance to be substantially equal to said target temperature coefficient of resistance value.

19. A method as claimed in claim 18, wherein said specifying physical parameters comprises specifying a position of said component in said circuit and dimensions of said component.

20. A method as claimed in claim 18, wherein said trimming said nominal resistance comprises applying a heating cycle, and said heating cycle comprises a sequence of heat pulses to trim said resistance value in a first direction and a sequence of heat pulses to trim said resistance value in an opposite direction.

21. A method as claimed in any one of claims 18 to 20, wherein said trimming said nominal temperature coefficient comprises selecting parameters of said heating cycle to determine a direction of trimming and an amount of trimming.

22. A method as claimed in claim 21, wherein said selecting parameters comprises selecting a first heat pulse of said sequence of heat pulses of said heating cycle to be of a given amplitude to determine a change in said temperature coefficient.

23. A method as claimed in any one of claims 21 to 22, wherein said electrical component is a resistor.

24. A method as claimed in any one of claims 21 to 23, wherein said electrical component is on a thermally isolated micro-platform on a substrate.

25. A method as claimed in claim 24, wherein a resistive heating element is provided for generating said sequence of heat pulses.

26. A method as claimed in claim 25, wherein said heating element is on said thermally isolated micro-platform.

27. A method as claimed in claim 22, wherein said trimming said temperature coefficient comprises driving said temperature coefficient down by using a first pulse above a temperature coefficient reversal threshold, and driving said temperature coefficient up using pulses below said threshold.

28. A method as claimed in any one of claims 20 to 27, wherein said trimming said temperature coefficient comprises applying a plurality of heating cycles.

29. A method as claimed in any one of claims 20 to 28, wherein said electrical component is on a thermally isolated micro-platform and wherein said resistance and said temperature coefficient can be measured at room temperature before applying a succeeding heat pulse.

30. A method as claimed in claim 29, wherein said temperature coefficient is measured during a cooling of said component with respect to an arbitrary scale, and said target temperature coefficient is substantially zero.

31. A method as claimed in claim 20, wherein said trimming said resistance comprises providing at least one pulse just above a trimming temperature threshold precision-trim said resistance while obtaining a negligible change in said temperature coefficient.

32. A method as claimed in any one of claims 17 to 31, wherein said component is part of a bridge circuit and said trimming said resistance creates a balanced state of said bridge circuit.

33. An apparatus for trimming a temperature coefficient of resistance of an electrical component made from a thermally mutable material possessing a hysteresis

characteristic with respect to a dependence of said temperature coefficient on said resistance, the apparatus comprising:

- a substrate having a portion for thermally-isolating said electrical component;
- heating circuitry having a decision-making module adapted to apply heating cycles to said component, each of said heating cycles comprising a sequence of heat pulses to trim a resistance value in a first direction and a sequence of heat pulses to trim said resistance value in an opposite direction, and wherein each heating cycle trims said temperature coefficient of resistance by an increment by cycling said resistance value away from and back towards a starting point, thereby using said hysteresis characteristic of said thermally mutable material; and

- measuring circuitry adapted to measure said resistance and said temperature coefficient of resistance.

34. An apparatus as claimed in claim 33, wherein said decision-making module is adapted to determine an amplitude of a heat pulse, a duration of said heat pulse, and a time interval before a succeeding heat pulse.

35. An apparatus as claimed in any one of claims 33 to 34, wherein said heating circuitry comprises a heating element for heating said electrical component.

36. An apparatus as claimed in any one of claims 33 to 35, wherein said electrical component is a resistor.

37. An apparatus as claimed in any one of claims 33 to 36, wherein said substrate has a thermally-isolated micro-platform for said electrical component.

38. An apparatus as claimed in claim 37, wherein said heating element is on said thermally isolated micro-platform.

39. An apparatus as claimed in claim 37, wherein said heating element is on a second thermally isolated micro-platform in close proximity to said electrical component.

40. An apparatus as claimed in any one of claims 33 to 39, wherein said decision-making module determines said amplitude of a heat pulse, duration of said heat pulse, and time interval before a succeeding heat pulse as a function of a history of pulses applied to said electrical component.

41. An apparatus as claimed in any one of claims 33 to 40, wherein said component is part of a bridge circuit, and said apparatus is for adjusting said temperature coefficient of a bridge output.

42. An apparatus as claimed in any one of claims 33 to 41, wherein said heating circuitry generates said heating cycle for trimming said temperature coefficient.

43. An apparatus as claimed in claim 42, wherein said heating cycle comprises a sequence of pulses to trim said resistance in a first direction and a sequence of pulses to trim said resistance in an opposite direction.

44. An apparatus as claimed in claim 43, wherein said decision-making module determines an amplitude of a first pulse of said sequence of pulses to determine a direction and an amount to trim of said temperature coefficient.

45. An apparatus as claimed in claim 33, wherein said electrical component is a first resistor and it resides on a first thermally-isolated micro-platform, and further comprising a second resistor made from a thermally-mutable material and residing on a second thermally-isolated micro-platform; wherein said heating circuitry comprises a first resistive heating element on said first thermally-isolated micro-platform and a second resistive heating element on said second thermally-isolated micro-platform; and wherein said measuring circuitry comprises a central resistive heating element placed on a third thermally-isolated micro-platform substantially symmetrically between said first resistor and said second resistor such that heating through said central resistive element results in a substantially symmetric temperature rise in said first resistor and

said second resistor.

46. An apparatus as claimed in claim 45, further comprising two additional resistors connected to said first resistor and said second resistor, such that a Wheatstone bridge is formed.

47. An apparatus as claimed in any one of claims 45 and 46, wherein said thermally mutable material is polysilicon.

48. An apparatus as claimed in any one of claims 45 to 47, wherein said central resistive element is made of polysilicon.

49. An apparatus as claimed in any one of claims 45 to 48, wherein said measuring circuitry and said calculating circuitry are on a same chip as said substrate.

50. A method for trimming a temperature coefficient of resistance of at least one electrical component made from a thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, while maintaining a substantially constant resistance value, the method comprising applying a heating cycle to trim said resistance value away from a target resistance value and back to said target resistance value, wherein the temperature coefficient of resistance is modified after applying said heating cycle by cycling said resistance value away from and back towards a starting point, thereby using said hysteresis characteristic of said thermally mutable material.

51. A method as claimed in claim 50, wherein applying the heating cycle comprises using a first set of pulses to trim away from said target resistance value and pulses of amplitudes lower than said first set of pulses to trim back to said target resistance value.

52. A method as claimed in claim 51, wherein said heating cycle comprises at

least one heating pulse having a first amplitude, followed by a plurality of heating pulses having amplitudes lower than said first amplitude.

53. A method as claimed in claim 52, wherein said plurality of heating pulses have varying amplitudes.

54. A method as claimed in claim 53, wherein each of said plurality of heating pulses has an amplitude equal to or lower than an amplitude of a previous pulse.

55. A method as claimed in any one of claims 50 to 54, further comprising applying a second heating cycle to continue trimming said temperature coefficient of resistance.

56. A method as claimed in claim 55, wherein said second heating cycle comprises a first pulse of equal or greater amplitude than a first pulse of a previous heating cycle.

57. A method as claimed in any one of claims 50 to 56, further comprising applying a plurality of subsequent heating cycles to further trim said temperature coefficient of resistance to a target temperature coefficient of resistance.

58. A method as claimed in claim 57, wherein said applying a plurality of subsequent heating cycles comprises trimming said temperature coefficient of resistance below said target temperature coefficient of resistance and gradually increasing said temperature coefficient of resistance to said target temperature coefficient of resistance.

59. A method as claimed in any one of claims 50 to 58, wherein said electrical component is a resistor.

60. A method as claimed in any one of claims 50 to 59, wherein said electrical component is on a thermally isolated micro-platform on a substrate.

61. A method as claimed in claim 60, wherein a resistive heating element is provided for generating said heating cycle.

62. A method as claimed in claim 61, wherein said heating element is on said thermally isolated micro-platform.

63. A method as claimed in any one of claims 50 to 62, wherein said at least one electrical component is a pair of matched resistors, and said temperature coefficient of resistance is a relative temperature coefficient of resistance.

64. A circuit comprising at least one electrical component made of a thermally mutable material possessing a hysteresis characteristic with respect to a dependence of said temperature coefficient on said resistance, defined by an upper limit and a lower limit of resistance, and having a temperature coefficient of resistance; characterized in that said resistance is set to a predetermined target resistance value and said temperature coefficient of resistance is set to a predetermined target temperature coefficient of resistance value independent of said target resistance value.

65. A circuit as claimed in claim 64, wherein said resistance and said temperature coefficient of resistance are adjusted in accordance with the method of any one of claims 1 to 32.

66. A circuit as claimed in any one of claims 64 to 65, wherein said predetermined target resistance value and said predetermined target temperature coefficient of resistance are set to respect an overall predetermined circuit state.

67. A circuit as claimed in any one of claims 64 to 66, wherein said at least one component comprises at least two components having a substantially matched



resistance value, and wherein said predetermined temperature coefficient of resistance value is a relative temperature coefficient of resistance between said at least two components.

68. A circuit as claimed in claim 67, wherein said substantially matched resistance value of said two components has a tolerance value no greater than 50 ppm.

69. A circuit as claimed in claim 67, wherein said substantially matched resistance value of said two components has a tolerance value no greater than 200 ppm.

70. A circuit as claimed in any one of claims 67 to 69, wherein said relative temperature coefficient of resistance of said two components has a tolerance value no greater than 50 ppm/K.

71. A circuit as claimed in any one of claims 67 to 69, wherein said relative temperature coefficient of resistance of said two components has a tolerance value no greater than 10 ppm/K.

72. A circuit as claimed in any one of claims 67 to 71, wherein said relative temperature coefficient of resistance of said two components is less than 3% of an as-manufactured temperature coefficient of resistance value of one of the two components.

73. A circuit as claimed in any one of claims 64 to 66, wherein said at least one component comprises at least two components and said target resistance value is a ratio between said at least two components, and wherein said matched resistance value of said at least two components has a tolerance value no greater than 200 ppm of said ratio.

74. A circuit as claimed in any one of claims 64 to 73, wherein said at least one component comprises at least two components and said predetermined temperature coefficient of resistance value is a relative temperature coefficient of resistance between

said at least two components, and said relative temperature coefficient of resistance of said at least two components is a desired non-zero relative difference from each other, and has a tolerance value no greater than 10ppm/K.

75. A circuit as claimed in any one of claims 64 to 74, wherein said circuit is one of a balanced bridge circuit, a calibrated amplifier, and a calibrated sensor system.

76. A circuit as claimed in any one of claims 67 to 75, wherein said at least two components are a pair of resistors connected in series, and wherein said target temperature coefficient of resistance is a relative temperature coefficient equal to substantially zero.

77. A circuit as claimed in any one of claims 64 to 76, wherein said at least one component is a resistor.

78. A circuit as claimed in any one of claims 64 to 77, wherein said at least one component is on at least one thermally-isolated micro-platform.

79. A circuit as claimed in claim 78, further comprising a heating element on said at least one thermally-isolated micro-platform.

80. A circuit as claimed in claim 79, further comprising a second thermally-isolated micro-platform having a second electrical component made from a thermally mutable material and a second heating element.

81. A circuit as claimed in claim 80, further comprising a central resistive heating element on a third thermally-isolated micro-platform substantially symmetrically between said at least one electrical component and said second electrical component such that heating through said central resistive element results in a substantially symmetric temperature rise in said at least one electrical component and said second electrical component.

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82. A circuit as claimed in any one of claims 64 to 81, wherein said at least one component is made of polysilicon.

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